

WHAT IS CLAIMED IS:

1. An optical pickup apparatus comprising:
an objective lens;
5 a lens holder that retains objective lens;
a fixing member;
four linear members having base ends supported by the fixing member
and distal ends coupled to the lens holder; and
a driving device that generates a magnetic force between the lens
holder and the fixing member to resiliently bend the linear members to
thereby drive the objective lens in at least one of a focusing direction and a
tracking direction,
wherein the four linear members have a generally identical
configuration, at least one portion of each of the four linear members in a
15 longitudinal direction thereof having a cross section that is squeezed and
deformed in at least one of the focusing direction and the tracking direction.
2. An optical pickup apparatus according to claim 1, wherein the
four linear members are disposed in a manner that each two of the linear
members overlap each other as viewed in the focusing direction and the
tracking direction.
- 25 3. An optical pickup apparatus according to claim 2, wherein each
of the four linear members has a deformed portion that has a cross section
that is compressed and deformed in the tracking direction.
4. An optical pickup apparatus according to claim 3, wherein each
of the linear members has end sections each having a uniform circular cross
section, and the deformed portion has a generally rectangular cross section

having a length in the focusing direction greater than a diameter of the circular cross section.

5. An optical pickup apparatus according to claim 4, wherein the lens holder has a driving coil for focusing and tracking operations, and the linear members are formed from a metal material that also serves as a power supply line to the driving coil.

10. An optical pickup apparatus according to claim 2, wherein each of the four linear members has a deformed portion having a cross-sectional configuration that is squeezed and deformed in the focusing direction.

15. An optical pickup apparatus according to claim 6, wherein each of the linear members has end sections each having a uniform circular cross section, and the deformed portion of each of the four linear members has a generally rectangular cross section having a length in the tracking direction greater than a diameter of the circular cross section.

20. An optical pickup apparatus according to claim 7, wherein the lens holder has a driving coil for focusing and tracking operations, and the linear members are formed from a metal material that also serves as a power supply line to the driving coil.

25. An optical pickup apparatus according to claim 2, wherein each of the four linear members has a first portion in a longitudinal direction thereof that is squeezed and deformed in the tracking direction and a second portion that is squeezed and deformed in the focusing direction, wherein the first portions have an identical length and an identical width at an identical location, and the second portions have an identical length and an identical width at an identical location

10. An optical pickup apparatus comprising:
an objective lens;
a lens holder that retains objective lens;
5 a fixing member;
four linear members having a generally identical configuration with
one another, each of the linear members having base ends supported by the
fixing member and distal ends coupled to the lens holder;
a driving device that generates a magnetic force between the lens
holder and the fixing member to resiliently bend the linear members to
10 thereby drive the objective lens in at least one of the focusing direction and
the tracking direction,
wherein each of the four linear members has a first portion with a
circular cross section and a second portion extending along a longitudinal
15 direction thereof with a flattened non-circular cross section that is flattened
to have a greater diameter in at least one of the focusing direction and the
tracking direction than a diameter of the circular cross section.

11. An optical pickup apparatus according to claim 10, wherein each
of the four linear members has end sections each defined by the first portion
with a circular cross section and a central section defined by the second
portion with a non-circular cross section between the end sections.
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12. An optical pickup apparatus according to claim 11, wherein the
central section is flattened by a compressive force applied in the tracking
direction to have a greater diameter in the focusing direction and a smaller
diameter in the tracking direction than the diameter of the circular cross
section of the end section.
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13. An optical pickup apparatus according to claim 11, wherein the central section is flattened by a compressive force applied in the focusing direction to have a greater diameter in the tracking direction and a smaller diameter in the focusing direction than the diameter of the circular cross
5 section of the end section.

14. An optical pickup apparatus according to claim 10, wherein each of the four linear members has end sections and a central section each having a circular cross section, a first section between the central section and one of
10 the end sections, the first section having a first non-circular cross section, and a second section between the central section and the other of the end sections, the second section having a second non-circular cross section.

15. An optical pickup apparatus according to claim 14, wherein the first section is flattened by a compressive force applied in the tracking direction to have a greater diameter in the focusing direction and a smaller diameter in the tracking direction than the diameter of the circular cross section, and the second section is flattened by a compressive force applied in the focusing direction to have a greater diameter in the tracking direction and a smaller diameter in the focusing direction than the diameter of the circular cross section.
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16. A method for manufacturing an optical pickup apparatus, the optical pickup apparatus comprising an objective lens that converges a laser beam on an optical recording medium, a lens holder that retains objective lens, a fixing member, and four linear members having base end sections supported by the fixing member and distal end sections coupled to the lens holder, wherein a magnetic force acting between the lens holder and the fixing member is used to resiliently bend the linear members to thereby drive
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the objective lens in at least one of a focusing direction and a tracking direction, the method comprising the steps of:

supporting the lens holder on the fixing member by the linear members; and then

5 compressing and deforming in the focusing direction and/or tracking direction one portion of each of the four linear members in a longitudinal direction thereof.

17. A method for manufacturing an optical pickup apparatus
10 according to claim 16, wherein the four linear members are disposed in a manner that each two of the linear members overlap each other as viewed in the focusing direction and the tracking direction, and the two of the linear members that overlap each other as viewed in the focusing direction are simultaneously compressed and deformed to form portions of the linear members that are deformed in the tracking direction.

18. A method for manufacturing an optical pickup apparatus
according to claim 17, wherein the two of the linear members that overlap each other are simultaneously squeezed and deformed by a press.

19. A method for manufacturing an optical pickup apparatus
according to claim 16, wherein the four linear members are disposed in a manner that each two of the linear members overlap each other as viewed in the focusing direction and the tracking direction, and the two of the linear members that overlap each other as viewed in the tracking direction are simultaneously compressed and deformed to form portions of the linear members that are deformed in the focusing direction.

20. A method for manufacturing an optical pickup apparatus according to claim 19, wherein the two of the linear members that overlap each other are simultaneously compressed and deformed by a press.

5 21. A method for manufacturing an optical pickup apparatus, the optical pickup apparatus comprising an objective lens, a lens holder that retains objective lens, a fixing member, four linear members having base end sections supported by the fixing member and distal end sections coupled to the lens holder, and a magnetic driver that generate a magnetic force acting 10 between the lens holder and the fixing member to resiliently bend the linear members to thereby move the objective lens in at least one of a focusing direction and a tracking direction, the method comprising the steps of:

15 providing four linear members each having a circular cross section along an entire length thereof;

 supporting the lens holder on the fixing member by the four linear members in a cantilever fashion; and

 applying a compressive force in the focusing direction and/or tracking direction to flatten at least one portion of each of the four linear members.

20 22. A method for manufacturing an optical pickup apparatus according to claim 21, wherein the four linear members are disposed in a manner that each two of the linear members overlap each other as viewed in the focusing direction and the tracking direction, and central portions of the each two of the linear members that overlap each other as viewed in the focusing direction are simultaneously flattened by a compressive force 25 applied in the tracking direction.

23. A method for manufacturing an optical pickup apparatus according to claim 22, wherein the two of the linear members that overlap each other are simultaneously flattened by a press.

24. A method for manufacturing an optical pickup apparatus according to claim 16, wherein the four linear members are disposed in a manner that each two of the linear members overlap each other as viewed in the focusing direction and the tracking direction, and central portions of the each two of the linear members that overlap each other as viewed in the tracking direction are simultaneously flattened by a compressive force applied in the focusing direction.

10 25. A method for manufacturing an optical pickup apparatus according to claim 24, wherein the two of the linear members that overlap each other are simultaneously compressed and deformed by a press.